Deqing Fu

Email: deqingfu@usc.edu   **Address**: Ginsburg Hall, USC, Los Angeles, CA 90089
Website: deqingfu.github.io **Office**: GCS 403E

Education

University of Southern California   2022 - Present
Ph.D. in Computer Science
Advisors: Vatsal Sharan & Robin Jia

University of Chicago   2020 - 2022
S.M. in Statistics

University of Chicago   2016 - 2020
S.B. in Mathematics with Honors
S.B. in Computer Science with Honors
A.B. in Statistics

Experience

Bluelight AI   Jun. 2025 – Present
Student Researcher
Hosts: John Carlsson, Jakob Hansen, Gunnar Carlsson

Simons Institute at UC Berkeley   Fall 2024
Visiting Graduate Student
Program: Modern Paradigms in Generalization

Meta Llama Team   May – Dec., 2024
Research Scientist Intern $\rightarrow$ *Student Researcher*
Host: Lawrence Chen; Peers: Tong Xiao, Rui Wang, and Pengchuan Zhang.

Google   Summer 2021, 2022, 2023
Software Engineering Intern
Teams: Image Search; Knowledge Engine; Bard (now Gemini) Multilingual.

Publications

* denotes equal contribution

TLDR: Token-Level Detective Reward Model for Large Vision Language Models
Deqing Fu, Tong Xiao, Rui Wang, Wang Zhu, Pengchuan Zhang, Guan Pang, Robin Jia, Lawrence Chen   ICLR 2025

Transformers Learn Low Sensitivity Functions: Investigations and Implications
Bhavya Vasudeva*, Deqing Fu*, Tianyi Zhou, Elliot Kau, You-Qi Huang, Vatsal Sharan   ICLR 2025

DeLLMa: Decision Making Under Uncertainty with Large Language Models

Ollie Liu*, Deqing Fu*, Dani Yogatama, Willie Neiswanger
ICLR 2025 Spotlight (Top 5.1%)   ICLR 2025

DreamSync: Aligning Text-to-Image Generation with Image Understanding Feedback

Jiao Sun*, Deqing Fu*, Yushi Hu*, Su Wang, Royi Rassin,
Da-Cheng Juan, Dana Alon, Charles Herrmann, Sjoerd van   NAACL 2025
Steenkiste, Ranjay Krishna, Cyrus Rashtchian

Transformers Learn to Achieve Second-Order Convergence Rates for In-Context Linear Regression

Deqing Fu, Tian-Qi Chen, Robin Jia, Vatsal Sharan   NeurIPS 2024
SoCalNLP Symposium 2023 Best Paper Award

Pre-trained Large Language Models Use Fourier Features to Compute Addition

Tianyi Zhou, Deqing Fu, Vatsal Sharan, Robin Jia   NeurIPS 2024

IsoBench: Benchmarking Foundation Models on Isomorphic Representations

Deqing Fu*, Ruohao Guo*, Ghazal Khalighinejad*, Ollie Liu*,
Bhuwan Dhingra, Dani Yogatama, Robin Jia, Willie Neiswanger   COLM 2024
Huggingface 🤗 : [Dataset]

SCENE: Self-Labeled Counterfactuals for Extrapolating to Negative Examples

Deqing Fu, Ameya Godbole, Robin Jia   EMNLP 2023

Harnessing the Conditioning Sensorium for Improved Image Translation

Cooper Nederhood, Nicholas Kolkin, Deqing Fu, Jason Salavon   ICCV 2021

Preprints

Resa: Transparent Reasoning Models via SAEs

Shangshang Wang, Julian Asilis, Ömer Faruk Akgül, Enes Burak
Bilgin, Ollie Liu, Deqing Fu, Willie Neiswanger

Zebra-CoT: A Dataset for Interleaved Vision Language Reasoning

Ang Li*, Charles L. Wang*, Kaiyu Yue*, Zikui Cai*, Ollie Liu*,
Deqing Fu*, Peng Guo*, Wang Bill Zhu*, Vatsal Sharan, Robin
Jia, Willie Neiswanger, Furong Huang, Tom Goldstein, Micah
Goldblum
Huggingface 🤗 : [Dataset] [Models]

Textual Steering Vectors Can Improve Visual Understanding in Multimodal Large Language Models

Woody Haosheng Gan*, <u>Deqing Fu</u>*, Julian Asilis*, Ollie Liu*, Dani Yogatama, Vatsal Sharan, Robin Jia, Willie Neiswanger

FoNE: Precise Single-Token Number Embeddings via Fourier Features
Tianyi Zhou, <u>Deqing Fu</u>, Mahdi Soltanolkotabi, Robin Jia, Vatsal Sharan

VisualLens: Personalization through Visual History
Wang Bill Zhu, <u>Deqing Fu</u>, Kai Sun, Yi Lu, Zhaojiang Lin, Seungwhan Moon, Kanika Narang, Mustafa Canim, Yue Liu, Anuj Kumar, Xin Luna Dong

Awards	**Viterbi Best Research Assistant Award** *(one per department)*	USC, 2025
	SoCalNLP Symposium 2023 Best Paper Award	SoCalNLP, 2023
	Provost's Fellowship	USC, 2022
	Susanne H. Rudolph Scholarship	UChicago, 2020-2021
	Liew Family College Research Fellows Fund	UChicago, 2020
	Dean's List	UChicago, 2016-2020

Grants

VESSL AI Academia Program, 1,200 A100 Hours ($\approx$ \$5,000 value)
PI: <u>Deqing Fu</u>   August 2025
Title: *Emergence of Fourier Features in Large Language Model Pretraining*

NSF ACCESS Allocation, 750,000 Credits ($\approx$ \$75,000 value)
PI: <u>Deqing Fu</u>, Co-PI: Robin Jia   August 2025 - August 2026
Title: *Robust Mathematical Reasoning with Fourier Language Models*

Invited Talks

Algorithmic Perspectives on Understanding Transformers
FlaNN Talk Seminar   Aug 25, 2025

Closing the Modality Gap:
Benchmarking and Improving Visual Understanding in Multimodal LLMs
Stanford NLP Seminar   May 22, 2025

Algorithmic Perspectives on Understanding Transformers
UChicago/TTIC NLP Seminar   May 08, 2025

Tutorial on the interplay between Theory and Interpretability
USC ML/NLP Joint Seminar   Apr 25, 2025

Algorithmic Perspectives on Understanding Transformers
Duke NLP Seminar   Feb 12, 2025

Guest Lecture on Interpretability and AI Safety
DSO 575: Driving Business Transformation with GenAI   Oct 24, 2024

Simplicity Bias orf Transformers to Learn Low Sensitivity Functions
USC NLP Lunch   Feb 22, 2024

Aligning Text-to-Image Generation with Image Understanding Feedback
USC NLP Lunch   Oct 19, 2023

Transformers Learn to Achieve Second-Order Convergence for In-Context Linear Regression
USC NLP Lunch   Mar 29, 2023

Services

Reviewer for conferences in
- **Machine Learning**: ICLR 2025, NeurIPS (2024, 2025), ICML 2025;
- **Natural Language Processing**: COLM 2024, EMNLP (2023, 2024), ACL (2024, 2025);
- **Computer Vision**: CVPR (2023, 2024, 2025), ECCV 2022, ICCV 2025

Organizer of USC ML/NLP Joint Reading Group   Jan 2025 – Present

Organizer of USC AI Safety Club   Jan 2024 – Jan 2025

Students Supervised

Master's and Undergraduate Students

Gustavo Carvalho (USC MS)	Feb 2024 – Present
Qilin Ye (USC UG → Duke MS)	Sep 2023 – Present
Woody Haosheng Gan (USC UG)	Sep 2023 – Present
You-Qi Huang (USC UG)	Sep 2023 – Mar 2024
Elliot Kau (USC MS)	Sep 2023 – Mar 2024
Tian-Qi Chen (USC MS)	Mar 2023 – Sep 2023

Teaching Experience

Teaching Assistant, CSCI 467: Introduction to Machine Learning
University of Southern California, Los Angeles, CA   Spring 2025

Teaching Assistant, CSCI 566: Deep Learning and its Applications
University of Southern California, Los Angeles, CA   Spring 2023

Teaching Assistant, BUSN 41301: Statistical Insight
Booth School of Business, University of Chicago, Chicago, IL   Fall 2021

Course Assistant, CMSC 31230: Fundamentals of Deep Learning
University of Chicago, Chicago, IL   Fall 2021

Course Assistant, MATH 20300: Analysis in Rn - I
University of Chicago, Chicago, IL   Spring 2018

Skills

C/C++, Python, LaTeX, MATLAB, R, Java, CUDA
PyTorch, TensorFlow, Keras, JAX, HuggingFace